ACCESSION #: 9909150157

NON-PUBLIC?: N

LICENSEE EVENT REPORT (LER)

FACILITY NAME: Oconee Nuclear Station Unit 1 PAGE: 1 OF 6

DOCKET NUMBER: 05000269

TITLE: Drop of Control Rod Group Results in Reactor Trip

EVENT DATE: 08/18/99 LER #: 1999-06-00 REPORT DATE: 09/09/99

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION:

50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:

NAME: L.E. Nicholson TELEPHONE: (864) 885-3292

Regulatory Compliance Manager

COMPONENT FAILURE DESCRIPTION:

CAUSE: SYSTEM: AA COMPONENT: XC MANUFACTURER: B015

REPORTABLE NPRDS: Y

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT:

On August 18, 1999, Oconee Unit 1 was in Mode 1 at 100 percent Full Power, when at approximately 1956 hours Unit 1 tripped. Operators stabilized the reactor in hot standby condition (mode 3). The unit post trip response was normal. The events recorder indicated that group 5 control rods had dropped into the core. Approximately three seconds later the Reactor tripped on a Reactor Protective System variable low pressure/temperature trip. There was no testing or maintenance being performed at the time of the trip.

The root cause of the trip was equipment malfunction of the rod group 5 programmer. Corrective actions include replacing the programmer and sending the suspect programmer offsite for further testing and evaluation.

The health and safety of the public was not compromised by this event.

END OF ABSTRACT

EVALUATION:

BACKGROUND

This report addresses a Reactor Trip, which is reportable per 10CFR50.73(a) (2) (iv) as "any event or condition that resulted in a automatic actuation of the reactor protection System."

The Unit 1 core [EIIS:AC] design has 69 control rods [EIIS:ROD] that are divided into eight groups. Groups 1 through 4 are the safety rods and are in the full out position during normal power operation to assure adequate shutdown margin. Groups 5 through 7 are regulating rods and are used to control reactor power. Group 8 rods are the axial power shaping rods used to help control the power imbalance within specified limits.

The Control Rod Drive (CRD) System [EIIS:AA] controls the operation of the control rods. Each of the regulating groups (5 though 7) has its own Programmer [EIIS:XC] as a part of the regulating (normal) power supply [EIIS:JX]. The Programmer accepts operational commands from the CRD System and controls the Silicon Controlled Rectifiers (SCRs) that sequentially

energize the six phases of the CRD stator causing rod movement in or out. If the power input/output from the programmer goes to zero, no power is supplied to the stator windings and the rods fall into the core.

The Reactor Protective System (RPS) [EIIS:JC] is a safety related system which monitors parameters related to the safe operation of the plant. The RPS provides a two out of four logic for tripping the reactor when a predetermined set point is exceeded. One of the set points is for variable low Reactor Coolant System [EIIS:AB] pressure/temperature. Tripping the reactor is accomplished via the reactor trip module relays [EIIS:RLY] which de-energize the CRD system AC and DC breakers causing all rods to drop.

EVENT DESCRIPTION

On August 18, 1999, at approximately 1956 hours, while operating at 100%. Full Power (mode 1), Unit 1 Control Rod Group 5 dropped into the core. No abnormal events, testing or maintenance procedures were in progress immediately before or during the time this event occurred.

When the control rods dropped, a reactor transient was induced. Reactor power rapidly decreased and after approximately three seconds, the reactor tripped on a variable low pressure/temperature Reactor Protective System (RPS) trip due to the thermal power reduction. Upon receiving the trip signal, all remaining rods dropped into the core well within the maximum allowed drop time. Post trip response was normal.

The cause of the reactor trip was determined to be equipment malfunction of the Group 5 Solid State Programmer (SSP).

Evaluation of the Group 5 power supply cabinet showed that 12OVac was always available to the SSP. The SSP regulated output voltage was measured at approximately 2 volts when it should have been between 4.75 to 5 volts.

The SSP microprocessor board was removed from the Group 5 SSP and was bench tested. The low voltage could not be duplicated on the bench. The circuit board was than reconnected in the Group 5 SSP and the low voltage condition

could not be duplicated. The Group 5 SSP was sent offsite for further testing and evaluation, Diagnostics are currently in progress and results are not yet complete.

A new SSP was installed and the 12OVac power connections were checked. one ring lug was replaced, but subsequent review determined it could not be a direct cause of this event.

The power and programmer wiring for all of the CRD power supplies were inspected for loose lugs and general physical condition. The inspection found two other items, a loose connection in Group 6 SSP and a bad lug in Group 8. These items were repaired, yet could not have caused the Group 5 rods to drop.

CAUSAL FACTORS

When the Control Rod Group 5 rods dropped, a reactor transient was induced. Reactor power rapidly decreased and after approximately three seconds, the reactor tripped on a variable low pressure/temperature Reactor Protective

System (RPS) trip due to the thermal power reduction. Upon receiving the trip signal, all remaining rods dropped into the core well within the maximum allowed drop time. Post trip response was normal.

An investigation determined that the root cause for this trip was a faulted SSP microprocessor, which caused the Group 5 rods to drop into the core. This current style SSPs were installed in the mid 1980s. There have been three other failures with these SSPs since they were installed. The first failure was a computer code problem with the microprocessor, the second failure was a loose 12OVac-supply wire, and the third failure was a shorted wire in the SSP plug assembly. These three past failures of the SSP are not similar in nature.

Therefore, based on no events in the past three years and a review of all the events for these specific microprocessors, this event was determined to be non-recurring.

CORRECTIVE ACTIONS

Immediate:

1. Operations personnel stabilized the Unit at Hot Standby conditions (mode 3).

Subsequent:

2. The programmer associated with group 5 control rods was replaced.

Planned:

3. Review and implement corrective actions as appropriate based on the findings from the ongoing testing and evaluation of the group 5 programmer.

There are no NRC commitments contained in this LER.

SAFETY ANALYSIS

While operating at 100% Full Power, Unit 1 tripped coincident with the dropping of Control Rod Group 5. The reactor tripped automatically on variable low Reactor Coolant System pressure/temperature Reactor Protective System trip. The plant response to this event was normal. No Engineered

Safeguards systems or Emergency Feedwater actuations were either required or occurred.

The dropping of one control rod is analyzed in the Updated Final Safety Analysis Report (UFSAR), Section 15.7, "Control Rod Misalignment Accidents." The dropping of a group of control rods is bounded by UFSAR, Section 15.7 analysis. An immediate reactor trip normally occurs on variable low pressure/temperature due to the induced power reduction. Station Operating practices requires a manual trip of the reactor if more than one control rod drops. The manual or automatic trip of the reactor terminates the initial transient and prevents the reactor from exceeding safety limits.

Reactor tilt/imbalance related problems caused by a group rod drop are less significant than the consequences of a single rod drop due to the distribution of the rod groups in the core.

The post-trip transient evaluation led to identification of three Main Steam Relief Valves (MSRV) being slightly out of tolerance low. The worst case being approximately -2.3 percent from nominal setpoint. Although out of the 1 percent tolerance assumed in the UFSAR, an operability evaluation concluded that the MSRVs could perform all required safety functions with the observed setpoints.

Evaluation has subsequently concluded that a new method for adjusting the lift setpoint, used for the first time during the most recent Unit 1 refueling outage, introduced residual stresses in the MSRVs that would not always be revealed during testing. Adjustments made to the MSRVs following the current trip used the original method.

All MSRVs were exercised until it was demonstrated that the lift setpoints were constant before placing Unit 1 on line. Corrective actions associated with the MSRVs are being addressed within the Corrective Action Program.

The health and safety of the public was not affected by this event.

ADDITIONAL INFORMATION

There were no releases of radioactive materials, radiation exposures in excess of limits, or personnel injuries associated with this event.

A review of reportable events indicated that no reactor trip events have occurred within the past three years due to the root causes identified in this event.

Duke Power

A Duke Energy Company

W.R. McCollum, Jr.

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September 9, 1999

U.S. Nuclear Regulatory Commission

Document Control Desk

Washington, D.C. 20555

Subject: Oconee Nuclear Station

Docket Nos. 50-269, -270, -287

Licensee Event Report 269/99-06, Revision 0

Problem Investigation Process No.: 0-99-03369

Gentlemen:

Pursuant to 10 CFR 50.73 Sections (a) (1) and (d), attached is Licensee

Event Report 269/99-06, concerning a Unit 1 reactor trip due to control

rods dropping. This report is being submitted in accordance with 10 CFR 50.73 (a)(2)(iv). This event is considered to be of no significance with respect to the health and safety of the public.

Very truly yours,

W.R. McCollum, Jr.

Attachment

Document Control Desk

Date: September 9, 1999

cc: Mr. Luis A. Reyes

Administrator, Region II

U.S. Nuclear Regulatory Commission

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